GENERAL DESCRIPTION

The GS2300 Series is a Sub-μA power consumption, high accuracy, low drop-out voltage regulator with Chip Enable Pin, high ripple rejection and fast discharge function.

The current limiter's fold-back circuit operates as a short circuit protection as well as the output current limiter for the output pin.

Output voltage is selectable from 0.8V to 5.0V which fixed by laser trimming technologies, Step=100mV.

The GS2300 is available in SOT23, SOT23-5L and DFN1x1-4L packages.

FEATURES

- Ultra-Low Power Consumption: 0.65μA(Typ.)
- Operating Voltage Range: from1.6V to7.0V
- Output Voltage Range: from 0.8V to 5.0V
- Maximum Output Current:400mA
- Output Accuracy: ±1.5%
- Low Dropout Voltage:640mV@400mA/3.3V
- Low Temperature Coefficient
- Current Limiting Protection
- Output Short-Circuit Protection
- Stable with 1uF Output Capacitor
- Fast Discharge Function
- Available in SOT23, SOT23-5L and DFN1x1-4L Packages

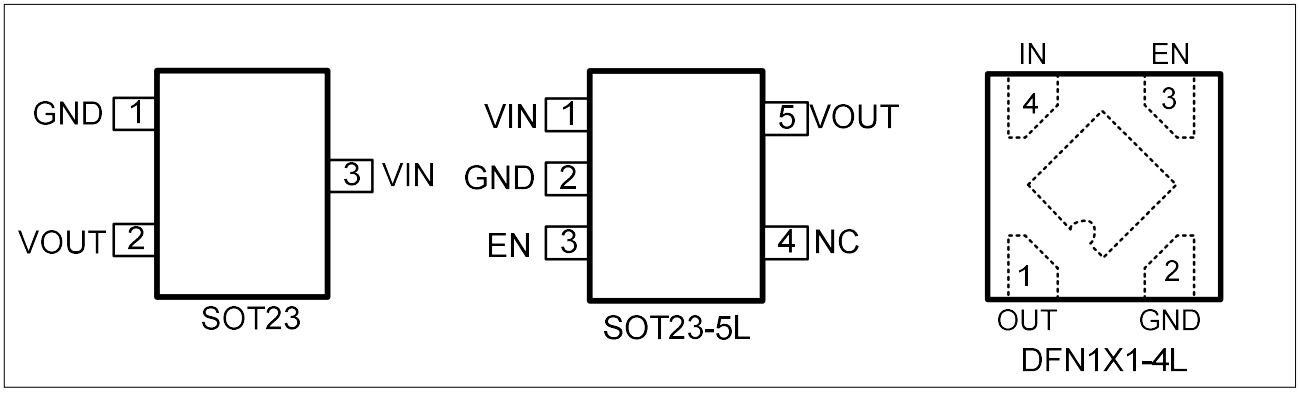
APPLICATIONS

- Battery-Powered Devices
- Portable Consumer Equipment
- Ultra Low Power Applications

PIN DESCRIPTION:

PIN No			SYMBOL	DESCRIPTTION
SOT23	SOT23-5L	DFN1×1-4L		
3	1	4	VIN	Power Supply Input
1	2	2, E-PAD	GND	Ground
--	3	3	EN	Chip Enable
--	4	--	NC	Not Connected
2	5	1	VOUT	Output

PIN ASSIGNMENT

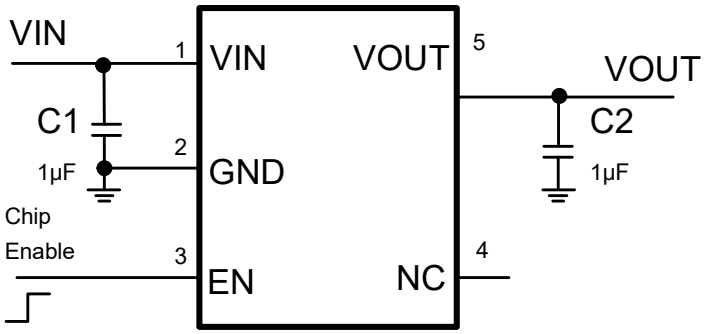


Order Information

Model	PIN-Package	Ordering Number	Packing Option
GS2300	SOT23	GS2300-XXTR3	3000pcs/Reel
	SOT23-5L	GS2300-XXTR5	3000pcs/Reel
	DFN1*1-4L	GS2300-XXFR4	10000pcs/Reel

Note:"XX"represents the type of voltage value.

TYPICAL APPLICATION CIRCUIT



Note:EN must NOT be left floating

ABSOLUTE MAXIMUM RATINGS(1):

(T_A= 25℃， unless otherwise specified.)

Symbol	Item		Rating	Unit
V_{IN}	Supply Voltage		-0.3~8.0	V
V_{EN}	EN Pin Voltage		-0.3~8.0	V
V_{OUT}	VOUT pin Voltage		-0.3~ (V_{IN}+0.3)	V
$V_{(ESD)}$	ESD Susceptibility, HBM(2)		±4000	V
PD	Maximum Power Dissipation	SOT23	285	mW
		SOT23-5L	450	
		DFN1x1-4L	350	
PTR	Package Thermal Resistance Θ_{JA}	SOT23	350	℃/W
		SOT23-5L	220	
		DFN1x1-4L	280	
T_J	Junction Temperature Range		-40~150	℃
T_{STG}	Storage Temperature Range		-40~150	℃
T_{SOLDER}	Lead Temperature (Soldering, 10 Sec)		260	℃

Note:

1. Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. per ANSI/ESDA/JEDEC JS-001

RECOMMANDED OPERATING RANGE:

SYMBOL	ITEM	VALUE	UNIT
V_{IN}	VIN Supply Voltage	1.6~7.0	V
V_{EN}	EN Pin Voltage	0~7.0	V
V_{OUT}	V_{OUT} Pin Voltage	0.8~5.0	V
I_{OUT}	Output Current	0~400	mA
T_J	Junction Temperature Range	-40~125	℃

ELECTRICAL CHARACTERISTICS:

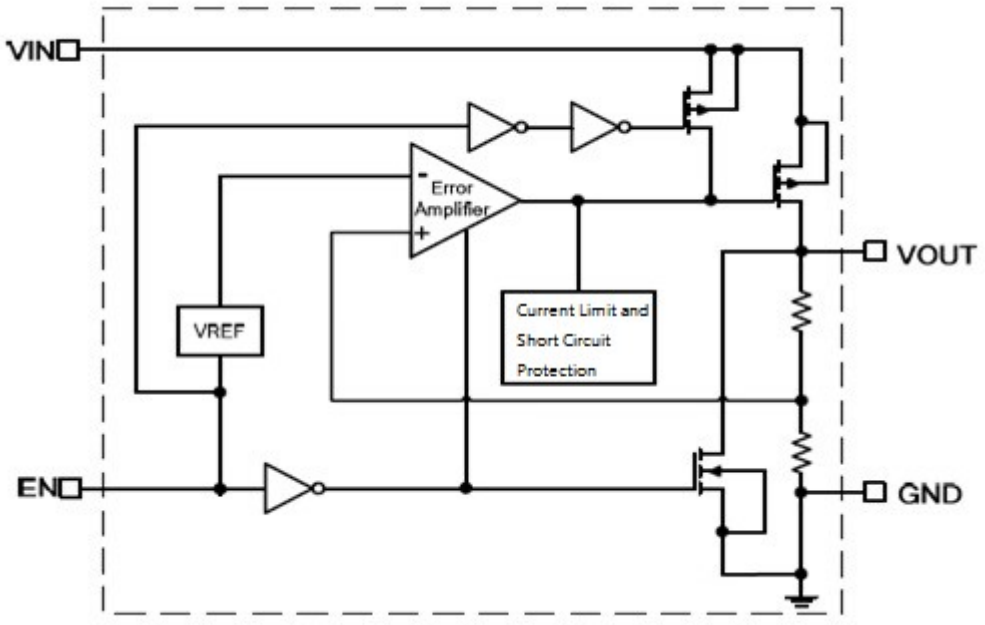
(V_{IN}=V_{OUT}+1V,V_{OUT}= 3.3V,C_{IN}=C_{OUT}=1uF,T_A =25℃, unless otherwise specified.)

Symbol	Parameter	TestConditions		MIN	TYP	MAX	Units
V_{IN}	Input Voltage			1.6		7.0	V
V_{OUT}	Output Accuracy	I_{OUT}= 1mA		-1.5		+1.5	%
I_{LIM}	Current Limit(1)	V_{IN}=4.3V, V_{OUT} =3.3V		410	530		mA
I_Q	Quiescent Current	V_{IN}=V_{EN}=V_{OUT}+1V, No Load			0.65	1.0	μA
I_{SHD}	Shutdown Current	V_{IN}=7.0V, V_{EN}=0V				0.1	μA
V_{DROP}	Dropout Voltage(2)	I_{OUT}=100mA, V_{OUT} =3.3V			130		mV
		I_{OUT}=200mA, V_{OUT} =3.3V			280		
		I_{OUT}=300mA, V_{OUT} =3.3V			460		
		I_{OUT}=400mA, V_{OUT} =3.3V			640		
S_{LINE}	Line Regulation	V_{IN}= V_{OUT}+1V to7.0V, I_{OUT}=1mA			0.15	0.3	%/V
S_{LOAD}	Load Regulation	1mA≤I_{OUT}≤400mA			0.0035	0.006	%/mA
I_{SHORT}	Short Current	V_{OUT}=0V			90		mA
V_{ENH}	EN High Voltage	V_{IN}=1.6Vto 7.0V, I_{OUT}=1mA		1.6			V
V_{ENL}	EN Low Voltage					0.5	V
T_{STR}	Startup Time	From V_{EN} 'L'→'H' to 95%*V_{OUT}, C_{OUT}=1uF, No Load			800		μs
PSRR	Power Supply Rejection Ratio	C_{IN}=None, I_{OUT}=10mA	f=217Hz		55		dB
			f=1KHz		45		
			f=10KHz		35		
T_{SD}	ThermalShutdown	Temperature rising			150		℃
△T_{SD}	TSD Hysteresis	Temperature falling			20		℃
R_{DSCHG}	R_{ON} of Discharge MOSFET	V_{IN}= V_{OUT}+1V, V_{EN}=0V			250		Ω

Notes:

1. Guaranteed by design
2. The dropout voltage is defined as V_{IN} - V_{OUT}, when V_{OUT}=95%*$V_{OUT(NOW)}$.

SIMPLIFIED BLOCK DIAGRAM:



DETAIL OPERATION DESCRIPTION:

The GS2300 is a low power consumption low drop-out voltage regulator. It consists of a current limiter circuit, a driver transistor, a precision voltage reference and an error correction circuit, and is compatible with low ESR ceramic capacitors. The current limiter's fold-back circuit operates as a short circuit protection as well as the output current limiter.

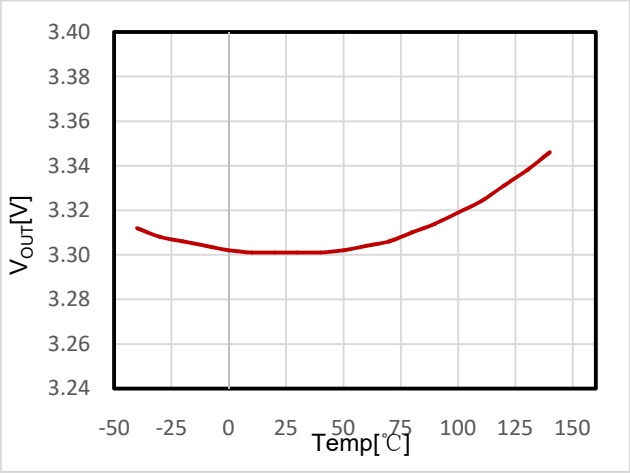
Current Limiting and Short-Circuit Protection
The current limit circuitry prevents damage to the MOSFET switch and the hub downstream port but can deliver load current up to the current limit threshold through the switch.When a heavy load or short circuit is applied to an enabled switch, a large transient current may flow until the current limit circuitry responds. Once this current limit threshold isexceeded the device enters constant current mode until thethermal shutdown occurs or the fault is removed.

TYPICAL OPERATING CHARACTERISTICS:

（*Tested under* T_J*=25*°C, unless otherwise specified）

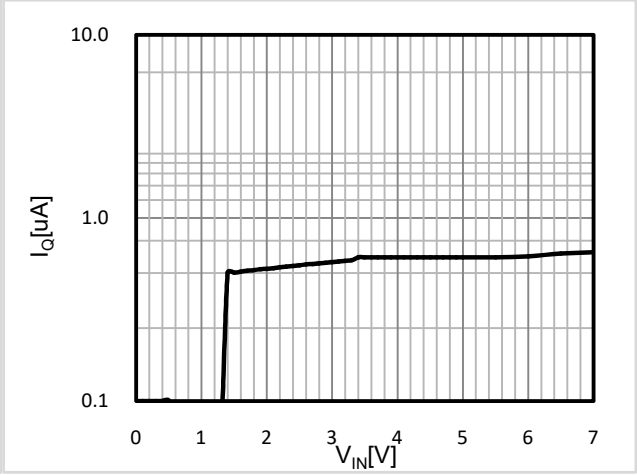
1. V_{OUT} vs Temperature

(V_{IN}=4.3V, V_{OUT} =3.3V, I_{OUT}=10mA)



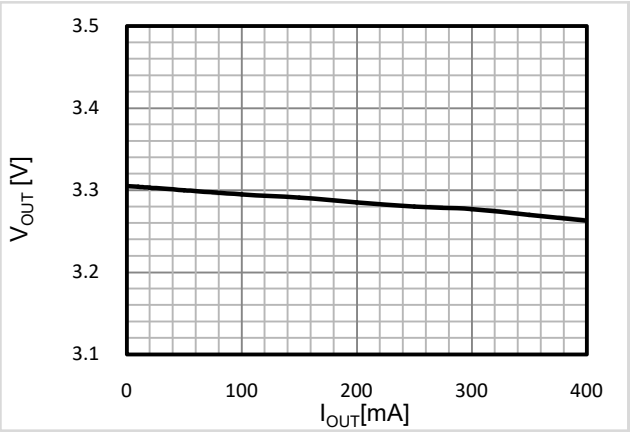
2. I_Q vs V_{IN}

(V_{OUT} =3.3V, I_{OUT}=0mA)



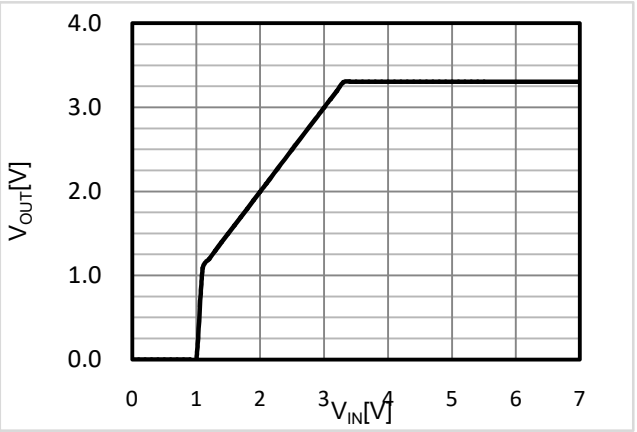
3. V_{OUT} vs I_{OUT}

(V_{IN}=4.3V, V_{OUT} =3.3V, I_{OUT}=0→400mA)



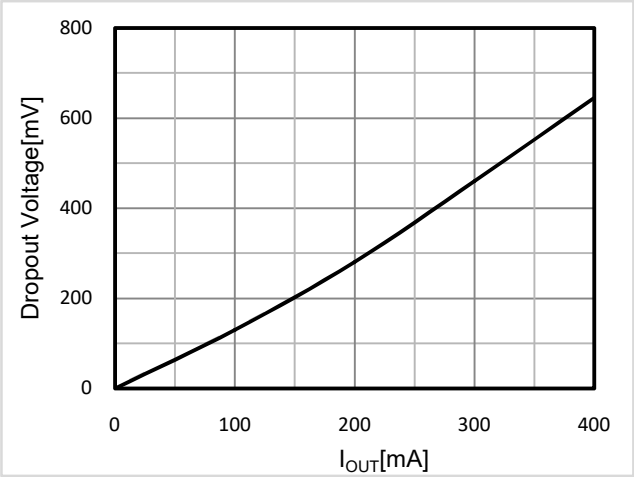
4.V_{OUT} vs V_{IN}

(V_{IN}=0V→7.0V, V_{OUT} =3.3V, I_{OUT}=1mA)



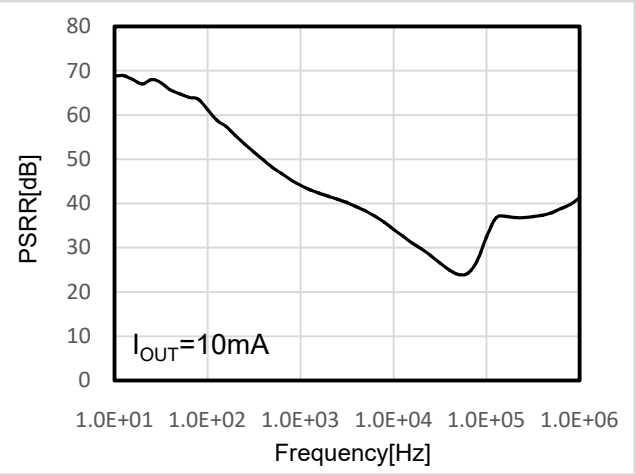
5. Dropout Voltage

(V_{OUT} =95%*3.3V, I_{OUT}=0→400mA)



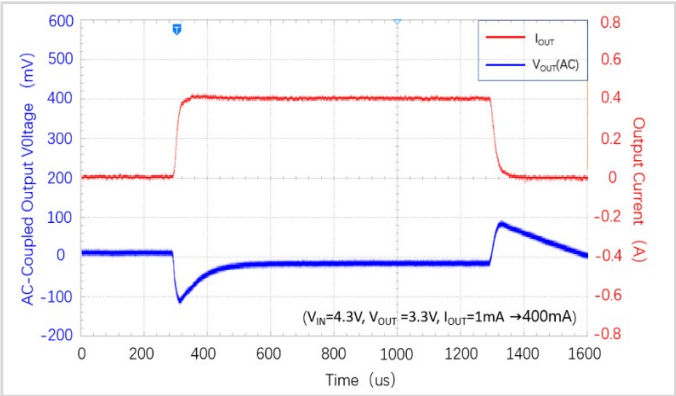
6. PSRR

(V_{IN}=4.3V, V_{OUT} =3.3V, V_{PP}=1.0V, C_{IN}=none, C_{OUT} =1uF)



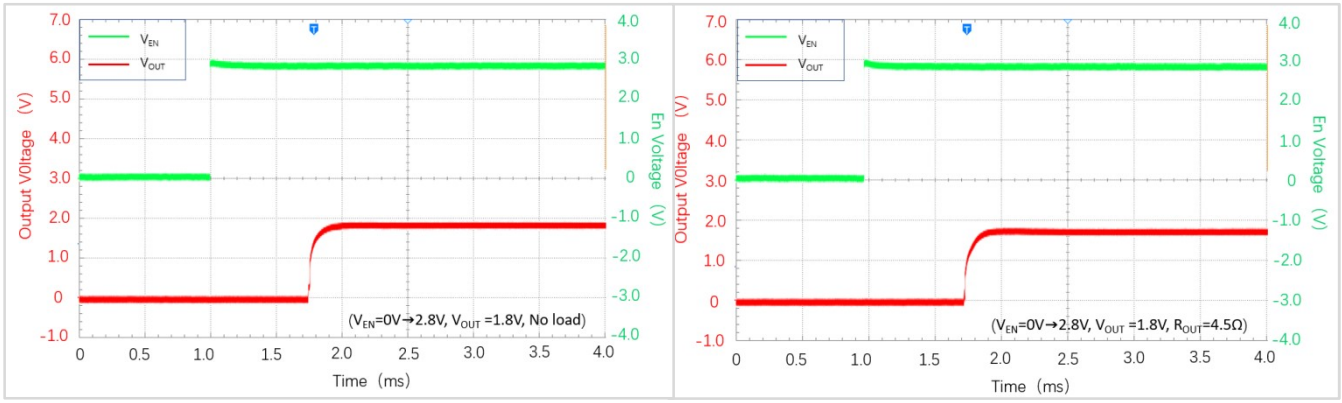
7. Load Transient Response

（V_{IN}=4.3V,V_{OUT}=3.3V,I_{OUT}=1mA→400mA）



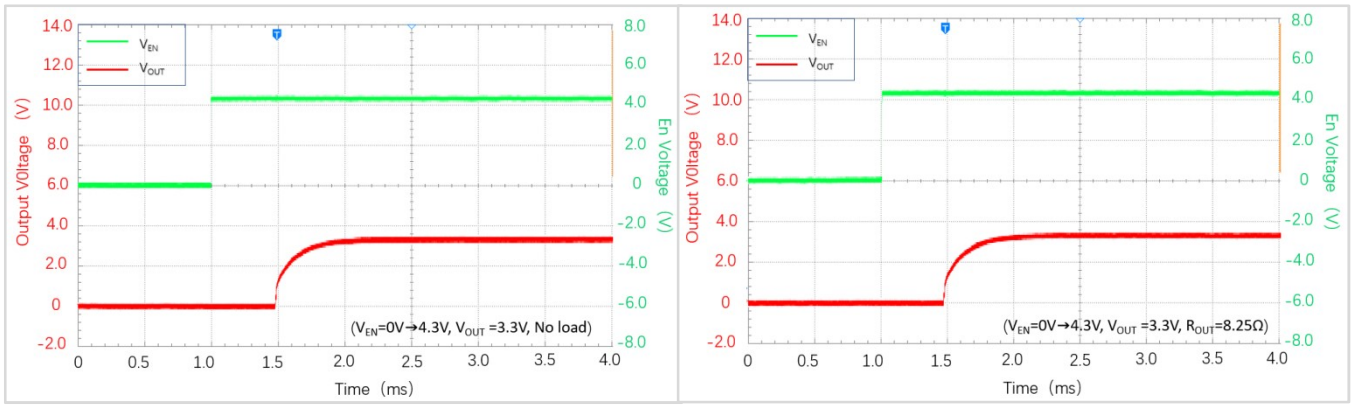
8. Start-Up9. Start-Up

（V_{EN}=0V→2.8V,V_{OUT}=1.8V,No load）（V_{EN}=0V→2.8V,V_{OUT}=1.8V,R_{OUT}=4.5Ω）

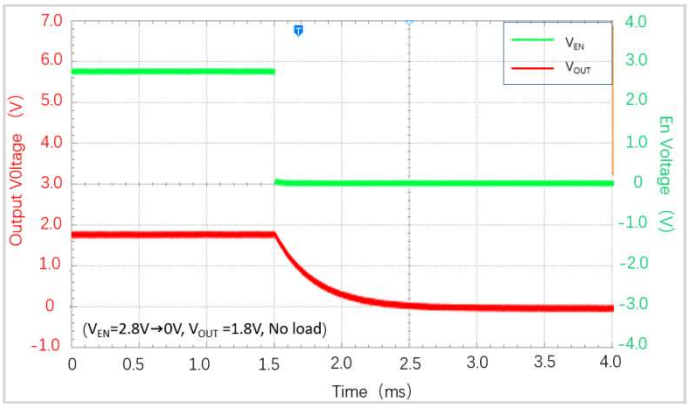


10. Start-Up11. Start-Up

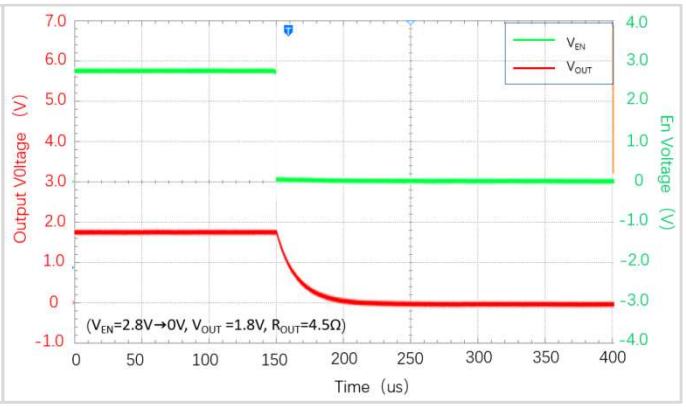
(V_{EN}=0V→4.3V,V_{OUT}=3.3V,No load）（V_{EN}=0V→4.3V,V_{OUT}=3.3V,R_{OUT}=8.25Ω）



12. Shut-Down （V_{EN}=2.8V→0V,V_{OUT}=1.8V,No load）

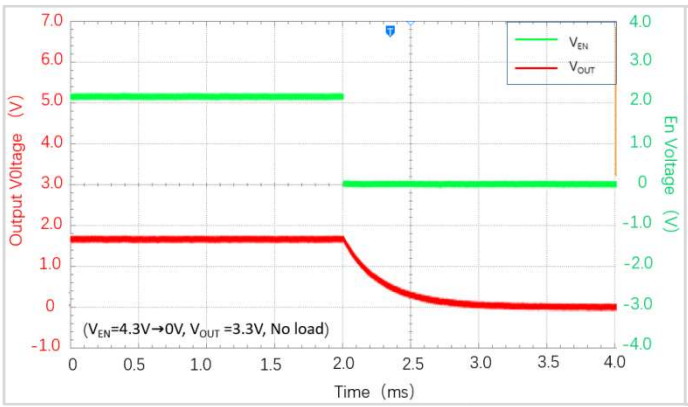


13. Shut-Down （V_{EN}=2.8V→0V,V_{OUT}=1.8V,4.5Ω）



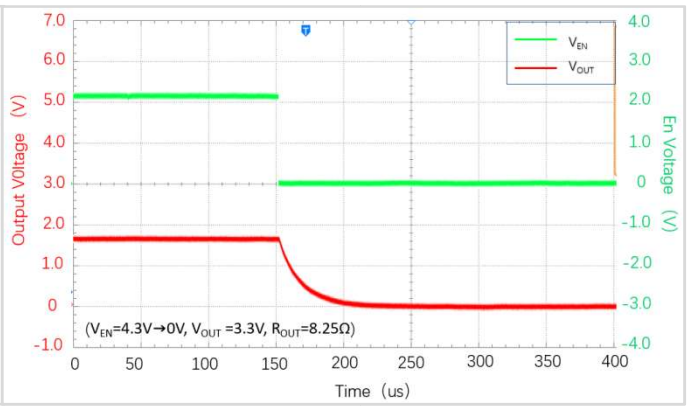
14. Shut-Down

（V_{EN}=4.3V→0V,V_{OUT}=3.3V,No load）



15. Shut-Down

（V_{EN}=4.3V→0V,V_{OUT}=3.3V,R_{OUT}=8.25Ω）



APPLICATION INFORMATION:

- **Input Capacitor Selection**

Like any low-dropout regulator, the external capacitors used with the GS2300 Series must be carefully selected for regulator stability and performance. Using a capacitor whose value is >=1μF on the GS2300 Series input and the amount of capacitance canbe increased without limit. An at least 10uF input capacitor is needed if input ripple voltage V_{PP}>1V. The input capacitor must be located a distance less than 0.5 inch from the input pin of the IC and returned to a clean analog ground.Any good quality ceramic or tantalum canbe used for this capacitor. The capacitor with larger value and lower ESR (equivalent series resistance) provides better PSRR and line-transient response.

- **Output Capacitor Selection**

The output capacitor must meet both requirements for minimum amount of capacitance and ESR in all LDOs application.The GS2300 Series is designed specifically to work with low ESR ceramic output capacitorin space-saving and performance conside ration. Using a ceramic capacitor whose value is at least 1μF on the GS2300 Series output ensures stability. An appropriate output capacitor can reduce noise and improve load transient response and PSRR. The output capacitor should belocated not more than 0.5 inch from theVOUT pin of the GS2300 Series and returned to aclean analog ground.

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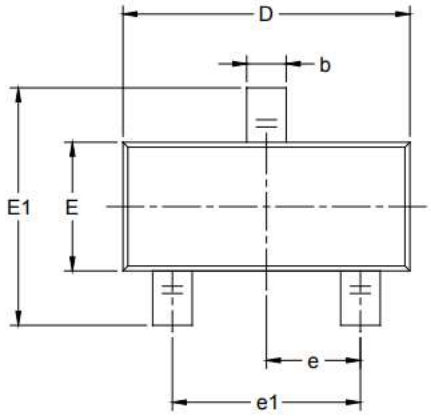
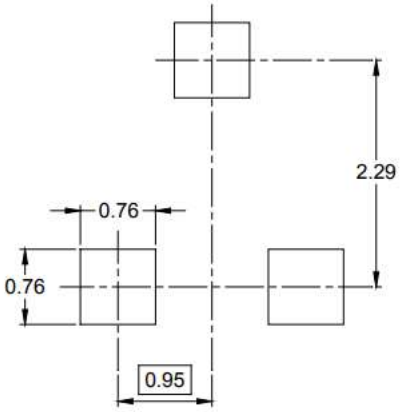
- **Layout considerations**

To improve ac performance such as PSRR,output noise, and transient response, it isrecommended that the PCB be designed with separate ground planes for VIN and VOUT, with each ground plane connected only at the GND pin of the device.

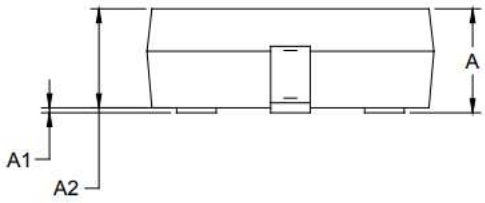
PACKAGE OUTLINE:

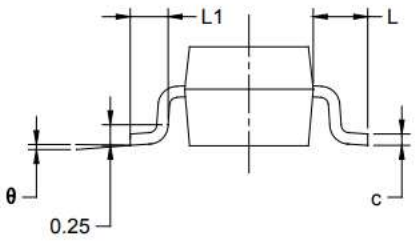
SOT23 Package





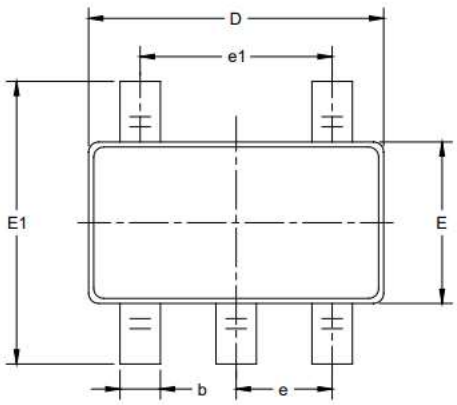
RECOMMENDED LAND PATTERN (Unit: mm)

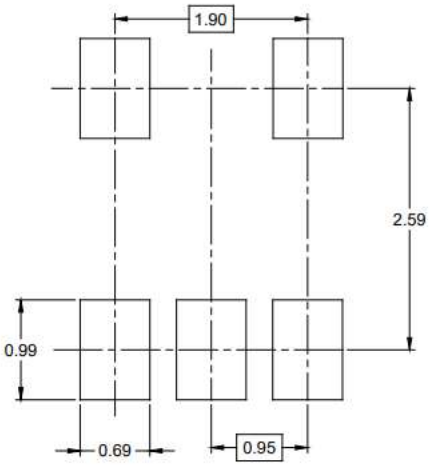




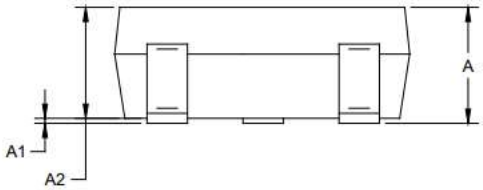
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

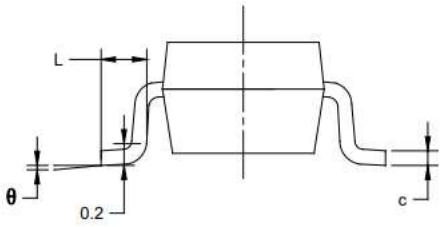
SOT23-5L Package





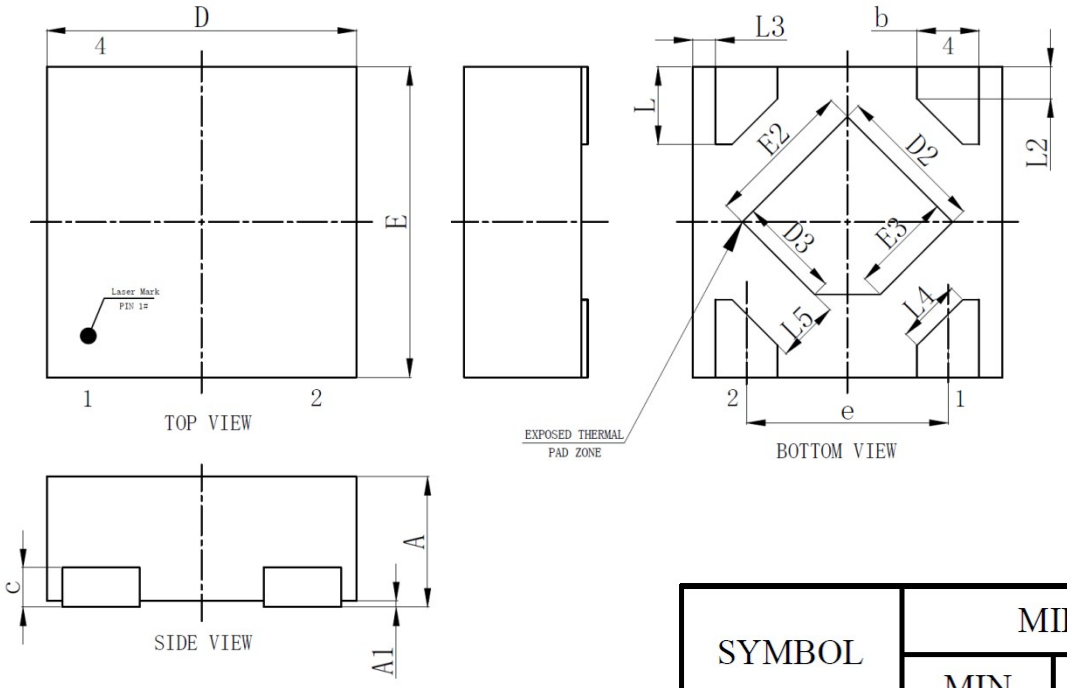
RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

DFN1x1-4L Package



SYMBOL	MILLIM	
	MIN	NO
A	0. 35	-
A1	0. 00	0.(
b	0. 15	0. 2
c	0. 127	
D	0. 95	1. (
D2	0. 38	0. 4
D3	0. 23	0. 3
e	0. 65B	
E	0. 95	1. (
E2	0. 38	0. 4